(19) JAPANESE PATENT OFFICE (JP)
(12) OFFICIAL GAZETTE FOR PATENT
PATENT APPLICATION (A)

(11) Japanese Official Patent Publication
Kokai S59-19671

43) Publication Date: February 1, 1984

(51) Int. Cl.[5] ID Code (s) Intra-Bureau Nos:
B24B 37/02 7512-3C
H01L 21/304 7131-5F

Request for examination: submitted
Number of Inventions: 1
(Total number of pages in the original: 3)

(54) Title of the Invention Polishing Device

(21) Patent Application No. S57-128251
(22) Filing Date: July 22, 1982

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Specifications

1. Title of the invention Polishing device

2. Claims

A polishing device comprised of a plurality of rotary tables capable of rotating in conjunction with an index table along the same axis situated on the same frame; and chuck tables capable of rotating in conjunction with the rotary tables along the same axis as well as having the function of securing the work to the surface; and stations separated from the index table that are equipped with polishing heads at the tip where these heads are capable of vertical motion and rotation via a hydraulic cylinder and these stations positioned along the same axis as the rotary table perform rough polishing, intermediate polishing and finish polishing.

3. Detailed Description of this Invention

This invention relates to a polishing device for a silicon chip used as a semiconductor part for electronic products and performs graduated levels of polishing on one surface of the wafer including finishing to a mirror finish.

Currently when conducting graduated levels of polishing on wafers, separate specialty devices are used, including a rough polishing device, an intermediate polishing device and a finish polishing device.

Since multiple devices are required, the expense is significant and requires additional labor to process on separate devices so the cost is high.

To solve the aforementioned problems, this invention has the objective of presenting a polishing device capable of conducting all of the polishing processes on a single device with wafers intermittently rotating along a track to a station for rough polishing, a station for intermediate polishing and a station for finish polishing all on the same frame.

Next is a description of the embodiment examples based on the figures. Figure 1 is an abbreviated top view of the polishing device relating to this invention and Figure 2 is a front view.

There are a plurality (4 in this embodiment example) of rotary tables 2 capable of rotating in conjunction with an index table 1 along the same axis situated on the same frame; and chuck tables 3 capable of rotating in conjunction with these rotary tables 2 along the same axis as well as having the function of securing the work to the surface.

There is station 1, station 2 and station 3 spaced apart on the index table 1 along the same axis as the rotary tables 2. These stations 1, 2 and 3 sequentially perform rough polishing, intermediate polishing and finish polishing. An air cylinder 7 is suspended from the top of the station. The rod 10 is constructed to rotate opposite to the chuck table 3 via a transmission means not shown in the figures such as gears from a motor 11. There is a polishing pad 9 of varying surface roughness on the tip of the rod 10 at each station. It is secured by a head 8 with the same diameter as the rotary table 2.

The index table 1 moves sequentially through each of the separate stations (in this embodiment example, at 4 minute intervals). The rotary tables 2 and chuck tables 3 stop when the index table 1 is in motion and after reaching the position for each station, rotation begins.

The timing of these operations can be conducted by a standard control means that performs detection by a sensor not shown in the figures located in the index table 1.

Next is a description of the operation.

First, as shown in Figure 1, when the index table 1 is stopped at position A, the wafer P to be polished is secured to the area on the chuck table 3. At this point, the rotary tables 2 and chuck tables 3 are also stopped.

Next, the index table 1 rotates at a 90° angle and moves to the rough polishing station 4 where rotation of the rotary tables 2 and chuck tables 3 begins at a specific speed. At the same time, the rod 10 on the air cylinder 7 drops so the polishing head 9 on the tip of the head 8 presses against the wafer P. The pressure can be determined according to the internal pressure control of the area. At each station a slurry is sprayed from a polishing solution hose (not shown in the figures) on to the wafer P and the rough polishing head 9 smoothes the biggest irregularities from the wafer P surface.

While in position A, a new wafer P is loaded on the next chuck table. After polishing at the rough polishing station 4 for a specific period of time, the head 8 is elevated by the air cylinder 7 and the wafer P is moved from the chuck table 3 on the index table 1 to the next station 5 and the rotary tables 2 and chuck tables 3 stop rotating.

When the first wafer P has reached station 5, polishing is conducted in the same manner using the intermediate polishing head 9 and the small irregularities remaining from the rough polishing are removed.

While in position A, a new wafer P is loaded on the next chuck table where polishing is conducted at station 5 for a specific period of time. When the polishing at station 5 is completed, the first wafer P is moved to station 6 where finish polishing is conducted. When the polishing is completed, it is moved to the next index stop position A and unloaded at the same time as a new wafer P is loaded.

The aforementioned operations are repeated in sequence and the chuck tables 3 where the wafers P are secured rotate. At the same time, the rotation around the axis of the rotary tables 2 prevents polishing irregularities from occurring due to the varying polishing speeds. The polishing pad 9 at the tip and the means for maintaining it in a parallel position can move in the vertical direction relative to the force applied from the head 8 to the chuck tables 3 so a uniform polishing surface can be obtained.

The aforementioned embodiment examples described the fixed rotation speed of the rotary tables 2 and chuck tables 3 but it is possible to maintain at particular rotation speeds for each station. The control means for this is complex so the stop time for the index table 1 at each station is fixed. The ability to vary rotation speeds of the rotary tables 2 and chuck tables 3 enables improved product quality and a reduction in labor.

This invention as described above is for a polishing device that performs uniform wafer polishing with a single unit.

4. Brief Description of the Figures

The figures show embodiment examples for this invention. Figure 1 is a top view of the polishing device relating to this invention. Figure 2 is a front view.

1...index table
2...rotary table
3...chuck table
4, 5, 6...station
7...air cylinder 8...head
9...polishing head 10...rod 11...motor
P...wafer

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Figure 1

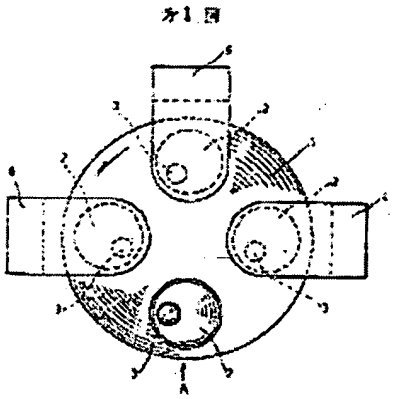

Figure 2